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Date: January 7, 2003

MEMORANDUM

From/De : Louis Kluberg for the NA50 Collaboration
To/à : SPS Committee
Subject/Sujet : Status report on experiment NA50

The NA50 Collaboration has devoted its efforts during the past year 2002 to proceed with the analysis of various sets of data and publication of results. A special effort has been done, in particular, on the analysis of the Pb-Pb data collected during the fall of year 2000. The Collaboration has also finished the analysis of two samples (out of three) of proton data collected during various different proton beam periods, from 1996 to 2000, which are to be used as the experimental reference for the Pb-Pb results.

As a result, we have published or submitted for publication the following articles:

P1.
Scaling of charged particle multiplicity in Pb-Pb collisions at SPS energies
Physics Letters B 530 (2002) 43; CERN-EP-2002-018.

P2.
Pseudorapidity distributions of charged particles as a function of centrality in Pb-Pb collisions at 158 and 40 GeV per nucleon incident energy
Physics Letters B 530 (2002) 33; CERN-EP-2002-017.

P3.
Phi production in Pb-Pb collisions at 158 GeV/c per nucleon incident momentum.
Accepted by Physics Letters B.

P4.
Charmonia and Drell-Yan production in proton-nucleus collisions at the CERN SPS.
Accepted by Physics Letters B.

We have also been able, after an intense collective effort during the past months of May and June to present, at the International Conference Quark Matter 2002, Nantes, July 2002, our first preliminary results on J/ψ suppression, based on our very last set of Pb-Pb data collected in year 2000. At this Conference, we made the three following presentations of new results:

C1.
Results on leptonic probes from NA50

C2. Charmonia absorption in p-A collisions at the CERN SPS: results and implications on Pb-Pb interactions

C3. Transverse momentum distributions of J/Psi produced in Pb-Pb and p-A interactions at the CERN SPS

We also presented our preliminary results based on our most recent data both at ICHEP2002 and at ISMD2002.

Finally, we are now preparing for submission to Physics Letters B
Charmonia production and suppression in p-A interactions at 450 GeV.
and
Fission cross-section of lead projectilesin Pb-nucleus interactions at 40 and 158 AGeV.

This analysis work has involved both senior and young colleagues. Progress was made through internal presentations and discussions that took place in seven Collaboration meetings held at CERN, as well as in several working sessions, also held at CERN, on the eve of the Quark Matter Conference. An important side-result of the accomplished work are several PhD thesis defended, during the year, in various institutions.

Although, as can be seen, we have made significant progress, in particular in the analysis of our year 2000 data, we are still in a position where we need several months to bring to their final status the analysis of the data on various physics subjects and write, eventually, the corresponding publications. The work, still to be done, includes:

1. Final results on J/psi suppression from the year 2000 data
2. Study of the J/psi transverse momentum from the year 2000 data
3. Study of the low mass resonances (ρ, ω and ϕ) from the year 2000 data
4. Analysis of the last proton target data sample which was collected in year 2000 with the aim of minimizing systematic effects in the comparison of the results from different targets
5. Flow studies from the anisotropy of energy and multiplicity azimuthal distributions

We hope to be able to carry this analysis and publication program to its end during the next months and would like therefore that Experiment NA50 is still considered as an *active* experiment at CERN for one more year.

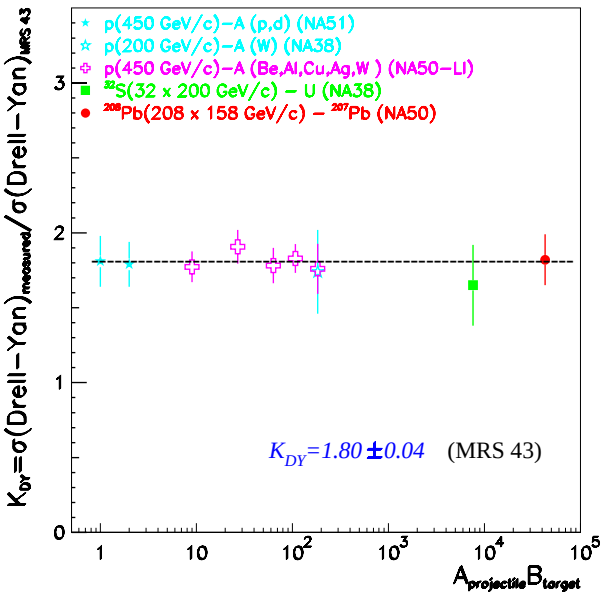

Figure 1: The ratio of measured to computed (MRS 43) Drell-Yan cross-sections from NA51, NA38 and NA50 experiments showing that the Drell-Yan yield is proportional to the number of nucleon-nucleon collisions from p-p up to Pb-Pb interactions.

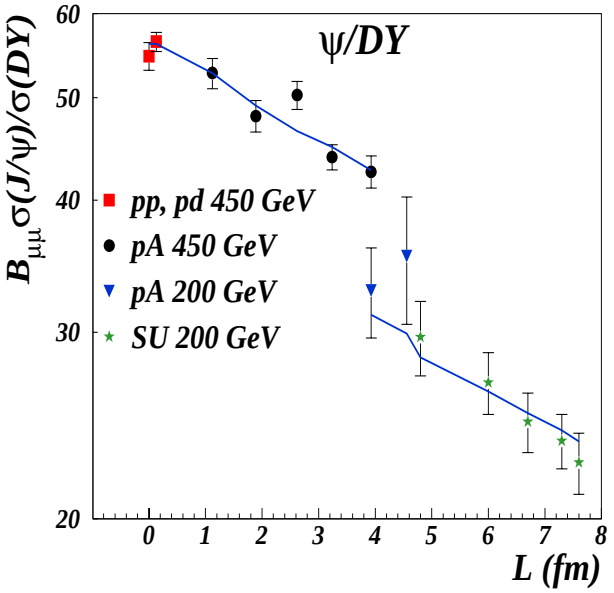

Figure 2: The J/ψ / DY ratio vs. L at two different beam energies and kinematical domains, from NA51, NA38 and NA50 data. The line is a Glauber fit to the data with a common value for the J/ψ absorption cross-section, independent from the colliding systems and the kinematical conditions. The fit leads to $\sigma_{abs} = 4.4 \pm 0.5\ mb$.

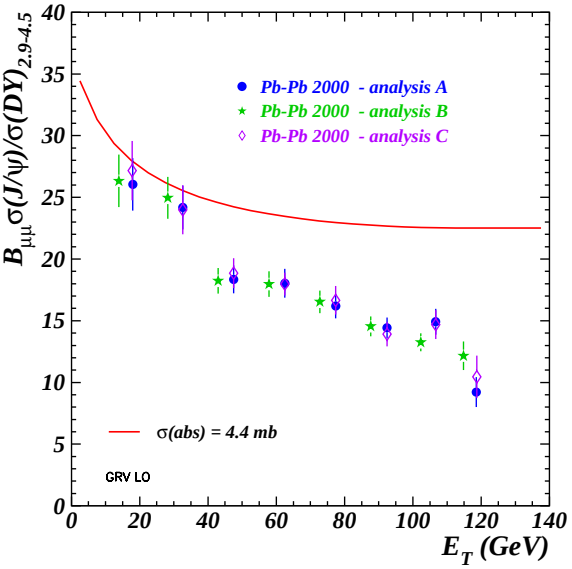

Figure 3: The J/ψ / DY ratio vs. $E_{\rm T}$. Preliminary results, based on dimuon events only, from three independent analysis of the same data.

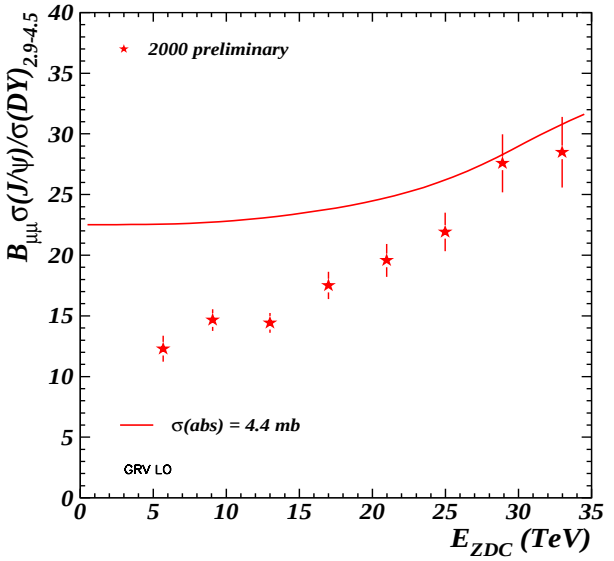

Figure 4: The J/ψ / DY ratio vs. $E_{\rm ZDC}$. Preliminary results, based on dimuon trigerred events only.

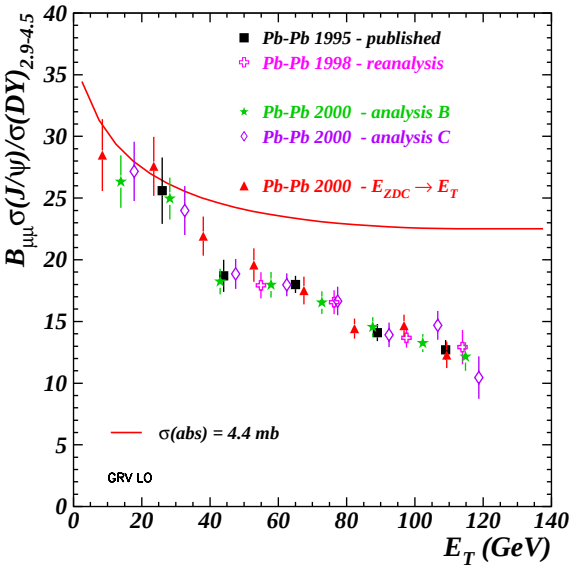

Figure 5: The J/ψ / DY ratio vs. transverse energy for the 2000 (preliminary results) and previous years runs.

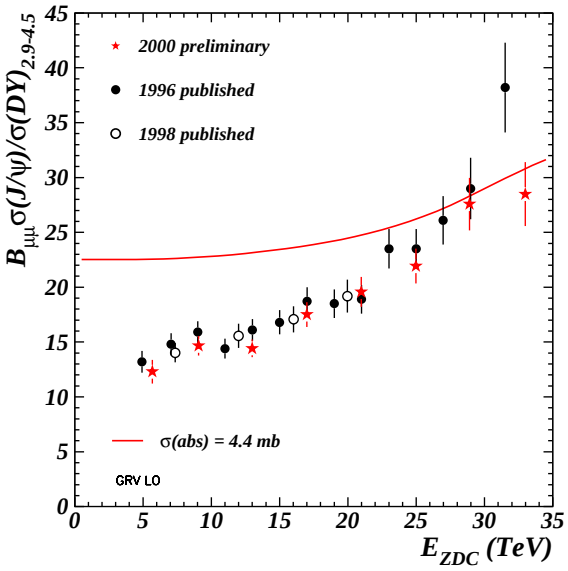

Figure 6: The J/ψ / DY ratio vs. forward energy for the 1996, 1998 and 2000 runs.